APPLICATION FOR

UNITED STATES LETTERS PATENT

[1] Be it known that I, Kevin B. Wolfe, a citizen of United States, residing at 6928 Stone Run Drive, Nashville, Tennessee 37211; has invented a new, original filtration barrier system for a "Modified Angled Silt Fence".

BACKGROUND OF THE INVENTION

[2] The present invention relates generally to sediment control barrier systems and relates more particularly to filtration barriers for waterborne silt and to methods and apparatus for installing the silt filtration barriers, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

[3] Sediment control barrier systems have a variety of uses and a wide range of industrial applications. They include: protection of surface soils from surface water erosion, the trapping of sediment, and run-off water filtration for improving water quality, and preventing waterborne silts and solids from entering channeled streams and drainage control systems.

[4] A wide variety of materials and structures are used in sediment control barriers systems and in geo-barrier systems in general. Since terminology is somewhat non-standardized, the following terms are defined herein. The term 'geo-fabric' refers to a geo-textile, geo-membrane or a geo-grid structure, or to a

combination of thereof. The term 'geo-textile' refers to a woven, non-woven, or knitted, biodegradable-resistant fabric that is sufficiently porous as to allow movement of air and water. Geo-textiles are typically load-bearing, synthetic fabrics used as a filter to prevent the passing of fine grained material such as silt or clay. The term 'geo-grid' refers to biodegradable-resistant material manufactured into an open, lattice like sheet configuration. Geo-grids are typically made of plastic and used as a reinforcing structure. The term 'geo-membrane' refers to essentially impermeable polymeric sheets. Geo-membranes are typically used as hydraulic barriers in liner and cover systems.

[5] Sediment control barriers include silt fences constructed of filtering fabrics, support posts and wire fences. Silt fences are, typically, single vertical barriers made from a geo-fabric supported in upright position by posts and support mesh. More particularly, typical silt fences are temporary sediment barriers made of woven synthetic filtration fabric supported by steel or wooden posts. Silt fences prevent sediments carried by un-channeled or sheet flow of storm or rainwater from leaving a ground site and either entering natural drainage channels or entering waste and storm drain systems. The barriers slow the runoff sheet flow and frequently create a ponding of water upstream of the silt fence. The reduction in water velocity causes the larger entrained soil particles to settle to the ground surface upstream of the silt fence. A silt fence constructed of permeable geo-textile sheets creates a filtration barrier that filters non-colloidal, suspended silt particles as the low velocity or ponded water passes through the silt fence to form an effluent

stream. The filtered silt particles are shed from the vertical fabric barrier surface of the standard silt fence and accumulate at its base. The size of the barrier openings determine the size of the particles filtered. The size, shape and number of the openings, as well as the height of the ponded water, determine the flow rate of the filtered effluent stream.

[6] Un-channeled surface water that is deposited upon ground having a sloped surface flows by gravity directed flow along paths determined by the contour of the ground surface. Typically, a silt fence is installed along a path spanning the sloped ground surface or along a path spanning beneath such a slope. The installation path is selected such that it is transverse to the water flow path and impedes the flow. But, the installation path is not necessarily orthogonal to the direction of runoff water flow at each point along the path. Since sheet flow run-off is stored upstream of a silt fence, the slope grade and the slope length determine the hydraulic load experienced by the silt fence. A maximum recommended slope length upstream of an installed silt fence is determined based on the mechanical strength of the silt fence assembly, the flow rate through the barrier and the volume of water per unit slope area per unit time expected to be deposited upon the slope.

[7] A standard silt fence assembly consists of a woven geo-textile sheet stapled to a series of long wooden stakes. The typical length of the stakes is 48 inches and the stakes are typically made of a hardwood. The stakes are installed at intervals of from 4 to 6 feet and are driven into the ground along a selected path typically over a contour of the surface transverse to the path of ground water run-

off. Frequently, a portion of geo-textile sheet extends beyond the ground surface as a ground skirt. The ground skirt can either lie on the ground surface in front of the barrier or can be buried in a trench in front of the barrier. The purpose of the ground skirt is to prevent the ponded water from freely flowing beneath the silt fence. Such flows would greatly reduce the effectiveness of the barrier and would tend to erode the ground surface that supports the barrier.

[8] There are a variety of problems associated with standard silt fencing installations. One problem is that in order to achieve a stable fence system, the wooden stakes must be driven into the ground at least 18 to 24 inches. Often due to hardpan soils or shallow bedrock, this is not possible to achieve. The result is an inadequate embedment depth of the post and a reduction in the stability of the silt fence.

[9] Another problem is the excess weight produced by accumulation of ponding water and/or silt along the upslope side of the fencing. This will cause the fabric barrier between the posts to sag and increase the stress on the supports. The shallower angle of the sagging fabric barrier tends to retain filtered silt. This increases the stress on the supports even more. In addition, the standard silt fencing is inefficient in its use of the fabric surface area. While a vertical silt barrier is desirable to shed filtered silt, most, if not all, of the filtering of silt occurs along the lower 12 inches or less of the vertical silt fence fabric. The upper exposed 14 to 20 inches rarely intercepts storm water run-off. The reason for this is because the weak post support system does not allow much water to accumulate behind the

fence before the lateral forces of hydraulic load become too much for the system to bear and ultimately cause the silt fence system to collapse.

[10] What is needed then is a silt fence system that can be installed using a shallower embedment depth of the posts while retaining or improving the stability of the silt fence.

[11] Additionally, what is needed is a silt fence assembly which is capable of carrying a greater hydraulic load than the vertical post of the standard silt fence assembly.

[12] An additional need is a silt fence assembly that increases percentage of geo-textile surface area used for filtering while maintaining effective silt shedding characteristics.

BRIEF SUMMARY OF THE INVENTION

[13] A hinged modified angle silt fence support assembly is made from an articulated front strut attached to a rear strut. The lower portion of the rear strut and the lower portion of the articulated front strut are sharpened for ease of installation in the earth. The lower portion of the articulated front strut is attached to an upper portion by a first hinge. The upper portion of the articulated front strut is attached to the rear strut by a second hinge. A geo-textile sheet is attached to both the upper and lower portions of the articulated front strut of multiple such support assemblies to form a modified angle silt fence filtration barrier, wherein the

upper portion of the filtration barrier can be installed at a shallower slope angle that the lower portion of the filtration barrier.

[14] When installed, the lower portion of each articulated front strut is driven in the ground at intervals along a terrain contour at a lower slope angle. The upper portion of the articulated front strut is rotated out of alignment with the lower portion to form a second slope angle. The rear strut is embedded in the ground and extends from the ground to provide reinforcing support for the upper portion of the articulated front strut.

[15] The lower portion of the filtration barrier is sufficiently steep so as to shed non-colloidal silt filtered by the lower portion of the barrier. While, the upper portion of the filtration barrier is sufficiently shallow as to expose the intercepted water flow to a sufficiently greater amount of filtration barrier surface, and, thus, increase the water flow capacity of geo-textile sheet. Additionally, the upper portion of the filtration barrier is sufficiently steep so as to shed at least a portion of the non-colloidal silt filtered by the upper portion of the barrier.

[16] The filtration barrier and, thus, the support assembly receives both lateral and vertical forces exerted by the weight of the ponded water and distributes those forces between the rear strut and the lower portions of the articulated front strut so as to more firmly embed the articulated front strut and the rear strut.

[17] Other embodiments of the invention incorporate additional filtration barrier sections and additional support struts to provide multiple compounding of

the filtration barrier surface. One embodiment incorporates an upwardly convex filtration barrier surface.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 is a cross-sectional perspective view of one embodiment of a modified angled silt fence adapted to form a barrier having a compound slope angle.

Fig. 2 is a cross-sectional perspective view of the embodiment shown in Fig. 1 in an installed condition.

Fig. 3 is a cross-sectional perspective view of an alternative embodiment of a modified angled silt fence adapted to form a barrier having a multiple compound slope angles.

Fig. 4 is an oblique view of the embodiment of the invention of Fig. 2

Fig. 5 is an oblique view of the embodiment of the invention of Fig. 3.

Fig. 6 is a cross-sectional perspective view of an alternative embodiment of a modified angled silt fence adapted to form a barrier having a convex slope.

Fig. 7 is a cross-sectional perspective view of the embodiment shown in Fig. 2 having a water flow though the barrier.

DETAILED DESCRIPTION OF THE INVENTION

[18] Figure 1 shows a cross-sectional view of one embodiment of a filtration barrier assembly 10 of this invention. A support assembly 20 is shown including a rear strut 30, the rear strut 30 having a rear strut upper end 32 and a rear strut lower end 34. The support assembly 20 also includes an articulated front support 40 constructed from multiple front struts 41 including an upper front strut 42 and a lower front strut 45. In this embodiment, an upper front strut 42 and a lower front strut 45 are shown as forming the articulated front support 40. The upper front strut 42 is shown having an upper front strut upper end 43 and an upper front strut lower end 44. The lower front strut 45 is shown having a lower front strut upper end 46 and lower front strut lower end 47.

[19] The struts of support assembly 20 are connected with flexible joints 26. In this embodiment, the rear strut upper end 32 is connected to the upper front strut upper end 43 with a pivoting joint 28. The upper front strut lower end 44 is also connected to the lower front strut upper end 46 with a pivoting joint 28. In this embodiment, the pivoting joints 28 are hinge joints 24.

[20] A temporary, removable reinforcing assembly 80 is attached across the pivoting joint 28 of the articulated front support 40. Removable splints 82 are placed across the pivoting joint 28 adjacent to the upper front strut lower end 44 and lower front strut upper end 46. A tape wrap 84 affixes the splints 82 to the articulated front support 40 so that linear alignment of the lower front strut 45 and

upper front strut 42 is maintained during installation of the lower front strut 45 into the ground surface 93.

[21] The support assembly 20 is adapted for installation into a ground surface 93. Although installable at normal silt fence embedment depths, the invention accommodates shallower than normal embedment depths of either or both the articulated front support 40 and rear strut 30 while retaining or improving the stability of the support assembly 20. Referring now to Figure 2, the rear strut lower end 34 and the lower front strut lower end 47 are adapted for embedment into a ground surface. The rear strut 30 is shown embedded in the ground surface 93 in the downstream ground surface area 95. The rear strut 30 extends towards the upstream ground surface area 94 so as to provide reinforcing support for the upper front strut 42 and the articulated front support 40.

[22] Referring now to Figures 2 and 7, the weight of the ponded water exerts both lateral and vertical forces upon the filtration barrier 70 and the support assembly 20 of the present invention. The geometry of each installed support assembly 20 distributes any lateral forces impinging the articulated front support 40 between the rear strut 30 and the lower front strut 45. The rear strut lower end 34 and the lower front strut lower end 47 are each subjected to lateral forces determined by various static loading factors, including: the height of the ponded water 100, the angle and depth of embedment of the rear strut lower end 34 and the lower front strut lower end 47, and the angular relationship between the installed struts. Within the normal parameters of installation of the support assembly 20 of

this embodiment of the present invention, at least a component of the lateral forces exerted by ponded water acts to force the rear strut lower end 34 further into the ground surface 93 and, thus, more firmly embed the rear strut 30.

[23] If the height of the ponded water reaches a level above the pivoting joint 28 of the articulated front support 40 of this embodiment, the support assembly 20 is subjected to a downward vertical force proportional to the weight of that portion of ponded water flowed above the upper front strut 42. The geometry of the installed support assembly 20 distributes those downward vertical forces between the rear strut lower end 34 and the lower front strut lower end 47. Within the normal parameters of installation of this embodiment of the present invention, at least a component of the downward vertical forces exerted by ponded water above the upper front strut 42 act to force the lower front strut lower end 47 and the rear strut lower end 34 further into the ground surface 93 and, thus, more firmly embed lower front strut 45 and the rear strut 30.

[24] Thus, the present invention provides a silt fence system that can be installed using a shallower embedment depth of the posts while retaining or improving the stability of the silt fence. Additionally, the silt fence assembly of the present invention is capable of carrying a greater hydraulic load than the vertical post of the standard silt fence assembly.

[25] Referring now to Figures 1 and 2, the upper front strut 42 and the lower front strut 45 are shown as adapted for receiving a geo-fabric barrier material suitable for forming a filtration barrier 70. Figures 1 and 2 show a geo-fabric sheet

50 formed from a geo-textile 51. In this embodiment, the geo-textile 51 is a woven geo-textile 52. The geo-fabric sheet 50 is shown attached to the upper front strut 42 and attached to the lower front strut 45. The geo-fabric sheet 50 has sufficient excess of fabric material at the hinged joint 24 between the upper front strut 42 and the lower front strut 45 to allow for articulation of the hinged joint 24. In alternate embodiments of the present invention, the geo-fabric sheet 50 is formed from a composite of geo-textiles 51 and geo-membrane sheets. In other alternate embodiments, the geo-fabric sheet 50 is formed from a composite of geo-textiles 51 and geo-grids.

[26] Referring again to Figures 1 and 2, a ground skirt 54 is attached to the geo-fabric sheet 50 along the lower end of the geo-fabric sheet 50. The ground skirt 54 is comprised of either the same material as the geo-fabric sheet 50 or can be made of a geo-membrane material. The ground skirt 54 can either lie upon the upstream ground surface area 94 in front of the geo-fabric filtration barrier 70 or can be buried in a trench 97 in front of the geo-fabric filtration barrier 70. The ground skirt 54 is positioned so as to prevent the ponded water from freely flowing beneath the silt fence. In alternate embodiments of the present invention the ground skirt 54 is omitted.

[27] Figure 2 shows an installed filtration barrier assembly 10 including at least two support assemblies 20. (Only one support assembly 20 is shown in this cross-sectional view.) The support assemblies 20 are adapted for installation along a spanning path selected along a contour across a ground surface 93. The spanning

path divides the ground surface 93 into an upstream ground surface area 94 in a downstream ground surface area 95, as determined by the direction of water flow 96 over the ground surface 93.

[28] Figure 2 further shows the support assembly 20 installed upon the ground surface 93. Each support assembly 20 is installed at interval points along the spanning path. The geo-fabric sheet 50 is installed upon the support assemblies 20 so as to form a filtration barrier 70. A lower front strut 45 of an articulated front support 40 is shown embedded in the ground surface 93 at an interval point along the spanning path. The lower front strut 45 is shown extending away from the upstream ground surface area 94 so as to form a first tilt angle 60. Tilt angles are herein defined as the angle formed by a strut and the vertical plane that is tangential to the spanning path at the point of installation of the respective support assembly 20. Figure 2 also shows the upper front strut 42 further extending away from the upstream ground surface area 94 so as to form a second tilt angle 62. The first tilt angle 60 is the steeper than the second tilt angle 62 angles. Herein, steepness of an angle refers to the comparison of an angle to a vertical angle (a vertical angle being an angle of 0 degrees from the tangential vertical plane). Similarly herein, shallowness of an angle refers to the comparison of an angle to a horizontal angle (a horizontal angle being an angle of 90 degrees from the tangential vertical plane). Unless otherwise stated, all angles correspond to a non-negative slope, wherein a non-negative slope describes a surface that, on average, increases in vertical height as it extends away from the upstream ground surface

area 94. Figures 2 shows the lower front strut 45 embedded in the ground surface 93 so as to form a first tilt angle of between 0 degrees and 45 degrees. Figure 2 also shows the upper front strut 42 as forming a second tilt angle 62 of between 15 degrees and 65 degrees.

[29] The geo-fabric sheet 50 shown in Figure 2 is attached to the articulated front support 40 so as to form a filtration barrier 70 having a lower filtration barrier section 74 and an upper filtration barrier section 72. The lower filtration barrier section 74 is sloped at a first slope angle 65. The upper filtration barrier section 72 is sloped at a second slope angle 66. The first slope angle 65 corresponds to the first tilt angle 60 and the second slope angle 66 corresponds to the second tilt angle 62.

[30] Referring now to Figure 3, a support assembly 20 is shown including a plurality of front struts 41 assembled in an articulated, linear configuration, wherein each front strut is disposed adjacent to at least one other front strut 41, and wherein each front strut 41 is flexibly attached to each adjacent front strut 41. The articulated front support 40 shown in Figure 3 includes a lower front strut 45, and two intermediate front struts 48. The intermediate front strut 48 distal to the lower front strut 45 comprises an upper front strut 42 similar to the one shown in Figure 2. One skilled in the art will recognize that increased curvature of the filtration barrier 70 can be accomplished by increasing the number of intermediate front struts 41 forming a single articulated front support 40. Multiple intermediate front struts 41 form a compound angled filtration barrier surface 71 having a corresponding number of barrier slopes and slope angles.

[31] Figure 3 further shows multiple rear struts 30 attached at different points to individual front struts 41 forming the articulated front support 40. Each of the installed rear struts 30 are embedded within the ground surface 93 and extended toward the upstream ground surface area 94 so as to provide support for the articulated front support 40 and the filtration barrier 70. Multiple rear struts 30 provide for additional load bearing ability and additional stability for the support assembly 20.

[32] Figure 3 additionally shows a transverse strut 86 attached to a rear strut 30 and a front strut 41. The transverse strut 86 provides additional rigidity and stability to the support assembly 20. One skilled in the art will recognize that numerous embodiments having transverse struts 86 can be adapted to provide both additional rigidity for the support assembly 20 and easily selectable predetermined geometries for installation of the support assembly 20. Similarly, one skilled in the art will recognize that various combinations of lateral struts (not shown) can be used to rigidly interlink each support assembly 20 to adjacently installed support assemblies 20.

[33] The embodiments of the present invention shown in Figures 2 and 3 comprise rigid struts that are not adjustable in length. However, one skilled in the art will recognize that adjustable rigid struts can be substituted for the non-adjustable struts as desired. For example, substitution of an adjustable rear strut for the rear strut 30 of the embodiment of the present invention shown in Figure 2

will allow for post-installation adjustment of the second tilt angle 62 and, thus the second slope angle 66 of the filtration barrier 70.

[34] Figure 3 further shows the lower front strut 45 embedded in the ground surface 93 at an interval point along the spanning path. The lower front strut 45 is shown extending away from the upstream ground surface area 94 so as to form a lower tilt angle 63, the lower tilt angle 63 corresponding to the first tilt angle 60 of the embodiment of the present invention shown in Figure 2. Figure 3 additionally shows the intermediate front strut 48 extending further away from the upstream area so as to form an intermediate tilt angle 64. Figure 3 shows the geo-fabric sheet 50 attached to the articulated front support 40 so as to form a filtration barrier 70 having a lower filtration barrier 74 sloped at a first slope angle 65 corresponding to the lower tilt angle 63. Figure 3 further shows the filtration barrier 70 having an intermediate filtration barrier section 74 sloped at an intermediate slope angle 67 corresponding to the intermediate tilt angle 64.

[35] Referring now to Figure 4, an embodiment of the present invention including a filtration barrier 70 is shown installed upon the ground surface 93 along the spanning path 98. The spanning path 98 is transverse but not necessarily orthogonal to the gravity directed water flow 96. The spanning path defines the upstream ground surface area 94 and the downstream ground surface area 95. The filtration barrier 70 includes at least one support frame 22. In this embodiment, the support frames 22 each comprise a support assembly 20. However, other

supporting structures may be substituted for the support assembly 20 so long as the desired barrier slope angles are achieved.

[36] Referring again to Figure 4, the filtration barrier 70 further includes a geo-fabric sheet 50 attached to the support assemblies 20 so as to form a filtration barrier surface 71 for impeding the water flow of the water runoff. The filtration barrier surface 71 is formed so as to have a compound slope. Figure 4 shows a lower filtration barrier surface 75 formed by a lower filtration barrier section 74 of the filtration barrier 70. The lower filtration barrier surface 75 is proximal to the ground surface 93 and would be the first surface to encounter rising levels of water as runoff water pools in front of the filtration barrier 70. The lower filtration barrier surface 75 extends upwards over the downstream ground surface area 95 so as to form a first slope angle 65. The slope angle is differentiated from tilt angle in that a slope angle, as used herein, describes the angle that a barrier surface makes with the vertical plane tangential to a point along the spanning path at which the slope angle is determined. The slope angle is herein determined along a path on the surface orthogonal to the spanning path, one example of a spanning path 98 is shown in Figure 4. Thus, the slope angle may vary as a function of the catenary of the geo-fabric sheet 50 as it is suspended between support assemblies 20. In general, a slope angle of a portion of the geo-fabric sheet 50 is approximately equal to the tilt angle of a corresponding support structure, that tilt angle adjusted for catenary factors such as excess fabric length and fabric loading.

[37] Figure 4 additionally shows an upper filtration barrier surface 73 disposed upon the upper filtration barrier section 72 extending upwards over the downstream ground surface area 95 so as to form a second slope angle 66. Figure 4 further shows a ground skirt 54 attached to the geo-fabric sheet 50 at the lower filtration barrier section 74. In this embodiment, the ground skirt 54 is disposed along the ground surface 93 in the upstream ground surface area 94 proximal to the spanning path 98.

[38] Figure 4 shows the first slope angle 65 of the lower filtration barrier surface 75 as including a slope angle between 0 degrees and 45 degrees. The second slope angle 66 of the upper filtration barrier surface 73 is shown as including a slope angle of between 15 degrees and 65 degrees. As stated above, the filtration barrier surface 71 has a compound slope. The term 'compound slope' herein is defined to mean a sloping surface having, in a vertical cross-section of the surface, at least two regions of the surface having different slope angles. Where, in a vertical cross-section of such a surface, the lowest region of the surface has the steepest slope angle and where each subsequent region of the surface has a slope angle that is shallower than any lower region of the surface and that is steeper than any higher region, but no region of the surface has a negative slope angle, then that surface shall be defined as having a falling, non-negative compound slope. Thus, for each embodiment of the invention shown in Figures 2-5 and 7, the filtration barrier surface 71 has a falling, non-negative compound slope.

[39] Referring now to Figure 5, including a filtration barrier 70 having multiple compound slopes is shown installed upon the ground surface 93 along the spanning path 98. A geo-fabric sheet 50 is affixed to a support frame 22 so as to form a lower filtration barrier section 74 and first and second intermediate filtration barrier sections 78. The second intermediate filtration barrier section 78 is most distal to the lower filtration barrier section 74 and includes an upper filtration barrier section 72. The lower filtration barrier section 74 includes a lower filtration barrier surface 75 extending along the spanning path and extending upwards over the downstream ground surface area 95. Sequentially adjacent is a first intermediate filtration barrier surface 79 which is disposed on the first intermediate filtration barrier section 78 in a like manner. A final upper filtration barrier surface 73 is disposed upon the upper filtration barrier section 72. Each filtration barrier surface forms a slope angle such that the lower first slope angle 65 formed by the lower filtration barrier surface is steeper than the subsequent intermediate slope angles 67. Each intermediate slope angle 67 is steeper than each subsequent intermediate slope angle 67. As in the embodiment of Figure 4, the embodiment of Figure 5 shows a lower slope angle 65 including a slope angle of between 0 and 45 degrees. Alternatively, this embodiment shows each intermediate slope angle 67 including a slope angle between 5 degrees and 90 degrees.

[40] An upwardly convex barrier 90 is shown in Figure 6 as an alternative embodiment of the present invention. The upwardly convex barrier 90 includes a filtration barrier 70 having a geo-fabric sheet 50 attached to a plurality of support

frame 22. A support frame 22 is shown having a resilient flexible strut 49 installed in a curved manner. In alternate embodiments the support frame 22 includes a curved rigid strut or includes a curved articulated assembly. Referring again to the embodiment of Figure 6, a geo-fabric sheet 50 is attached to the resilient flexible strut 49 so as to form an upwardly convex barrier 90 having varying tangential slope angles 92 of between 0 degrees and 90 degrees. In this embodiment of the invention, the steepest tangential slope angles are at such points of the curved surface as are most proximate to the spanning path along the ground surface 93.

[41] Referring now to the embodiment of the invention shown in Figure 7, a filtration barrier 70 of Figure 4 is shown installed upon the ground surface 93 along the spanning path 98 and impeding a water flow 96. The geo-fabric sheet 50 is shown attached to the support assemblies 20 so as to form a filtration barrier 70 having a filtration barrier surface 71 adapted to filter non-colloidal silt from the water flow 96. The filtration barrier 70 is shown including a lower filtration barrier section 74 having lower filtration barrier surface 75 and extending from the ground surface 93 upwards above the downstream ground surface area 95 at a first slope angle 65. The filtration barrier 70 is shown further including a upper filtration barrier section 72 having upper filtration barrier surface 73 and extending from the lower filtration barrier section 74 further upwards above the downstream ground surface area at a second slope angle 66, wherein the first slope angle 65 is steeper than the second slope angle 66.

[42] An accumulation of ponded water flow is shown having a height of water 100 sufficient to submerge the lower filtration barrier surface 75 and at least a portion of the upper filtration barrier surface 73. Water flows through the lower filtration barrier surface 75 such that non-colloidal silt 99 is filtered from the water flow 96. The first slope angle 65 of the lower filtration barrier surface 75 is sufficiently steep so as to cause a portion of the non-colloidal silt 99 filtered by the lower filtration barrier surface 75 to fall by gravity away from the lower filtration barrier surface 75.

[43] Although a greater height of water 100 produces greater static head and, thus, a greater flow of water through the lower filtration barrier surface 75, a greater height of water 100 produces significant lateral forces that can substantially reduce the stability of the filtration barrier 70. It is desirable to minimize the maximum height of water 100 to which the filtration barrier 70 is exposed. For a given amount of deposited water and water deposition rate, the maximum height of water 100 to which the filtration barrier 70 is exposed is determined by the flow rate through the filtration barrier surface 71. In a standard vertical silt fence assembly, a geo-textile sheet 50 formed from a geo-textile 51 has a nominal water flow capacity proportional to the height of water 100 of an intercepted water flow 96. In the embodiment of the present invention shown in Figure 7, the second slope angle 62 is sufficiently shallow so as to expose the intercepted water flow to a sufficiently greater amount of filtration barrier surface 71 so as to increase the water flow capacity of geo-fabric sheet 50 as proportional to the height of water 100

of an intercepted water flow 96. Additionally, the second slope angle 66 is sufficiently steep so as to cause a portion of the non-colloidal silt 99 filtered by the upper filtration barrier surface 73 to fall away from the upper filtration barrier surface 73. This shedding of filtered sediment 99 reduces the mechanical loading of the support assemblies 20 and the filtration barrier surface 71. This novel modification of the slope of the surface of the silt fence provides a silt fence assembly that increases the percentage of geo-fabric sheet 50 surface area used for filtering while maintaining effective silt shedding characteristics of the filtration barrier surface 71. Figure 7 illustrates the functioning of an embodiment of the present invention including a filtration barrier surface 71 having a singly compounded slope. Other embodiments of the present invention presented above employ multiple compound barrier slopes and would function in a similar manner. In particular, an upwardly convex barrier 90 may be curved so as to maximize the water flow capacity of a geo-fabric sheet 50 formed from geo-fabric 51 as relative to the nominal water flow capacity for a given height of water 100.

[44] In the embodiment of the present invention shown in Figures 1-7, the geo-fabric sheet 50 is formed from geo-fabric 51. The present invention contemplates geo-fabric sheets 50 formed from geo-membranes and geo-grids as well. In the embodiment of the present invention shown in Figure 7, the filtration characteristics of the geo-textile 51 are uniform across the height of the filtration barrier surface 71. However, it would be obvious to one skilled in the art that variation of the degree of porosity for geo-fabric sheets can be combined with

barriers having multiple filtration barrier slopes or convexly curving surfaces to provide even greater improvements of water flow capacity through the filtration barrier surfaces.

[45] Thus, although there have been described particular embodiments of the present invention of a new and useful Modified Angled Silt Fence, it is not intended that such references be construed as limitations upon the scope of this invention except as set forth in the following claims.